Radiofrequency Ablation of the Renal Sympathetic Nerves as a Treatment for Resistant Hypertension

Description

Radiofrequency ablation (RFA) of the renal sympathetic nerves is thought to decrease both the afferent sympathetic signals from the kidney to the brain and the efferent signals from the brain to the kidney. This procedure decreases sympathetic activation, decreases vasoconstriction, and decreases activation of the renin-angiotensin system. RFA of the renal sympathetic nerves may act as a nonpharmacologic treatment for hypertension and has been proposed as a treatment option for patients with resistant hypertension.

OBJECTIVE

The objective of this evidence review is to determine whether the use of radiofrequency ablation of the renal sympathetic nerves improves the net health outcome in individuals with hypertension resistant to standard medical management.

POLICY STATEMENT

Radiofrequency ablation of the renal sympathetic nerves is considered investigational for the treatment of resistant hypertension.

BENEFIT APPLICATION

Experimental or investigational procedures, treatments, drugs, or devices are not covered (See General Exclusion Section of brochure).

FDA REGULATORY STATUS

No RFA devices have been approved by the U.S. Food and Drug Administration (FDA) for ablation of the renal sympathetic nerves as a treatment for hypertension. Several devices have been developed for this purpose and are in various stages of application for FDA approval (FDA product code: DQY):

- **Symplicity™ Renal Denervation System** (Medtronic). In April 2018, FDA approved an investigational device exemption pivotal trial, SPYRAL HTN. The trial will be randomized and sham-controlled.
- **The EnligHTN™ Multi-Electrode Renal Denervation System** (St. Jude Medical) is an RFA catheter using a 4-point multiablation basket design. In January 2014, the EnligHTN™ Renal Guiding Catheter was cleared for marketing by FDA through the 510(k) process, based on substantial
equivalence to predicate devices for the following indication: percutaneous use through an introducer sheath to facilitate a pathway to introduce interventional and diagnostic devices into the renal arterial vasculature.

The OneShot™ Renal Denervation System (Covidien) is an irrigated RFA balloon catheter, consisting of a spiral-shaped electrode surrounding a balloon. (In 2014, Covidien abandoned development of its OneShot™ Renal Denervation program.)

The Vessix™ Renal Denervation System (Boston Scientific; formerly the V2 renal denervation system, Vessix Vascular) is a combination of an RF balloon catheter and bipolar RF generator technologies, intended to permit a lower voltage intervention.

Other RFA catheters (eg, Thermocouple Catheter™ [Biosense Webster]) used for other types of ablation procedures (eg, cardiac electrophysiology procedures) have been used off-label for RFA of the renal arteries.

Rationale

Summary of Evidence

For individuals who have hypertension resistant to standard medical management who receive RFA of the renal sympathetic nerves, the evidence includes at least 10 RCTs, numerous systematic reviews of the RCTs, as well as multiple nonrandomized comparative studies and case series. Relevant outcomes are symptoms, change in disease status, morbid events, medication use, and treatment-related morbidity. The largest trial, the Symplicity HTN-3 trial, used a sham-controlled design to reduce the likelihood of placebo effect and demonstrated no significant differences between renal denervation and sham control patients in office-based or ambulatory blood pressure at 6-month follow-up. Results from Symplicity HTN-3 have been supported by a subsequent sham-controlled trial. The Symplicity HTN-3 results were in contrast to other studies, including Symplicity HTN-2 and the Renal Denervation for Hypertension (DENERHTN) trial, which reported efficacy in reducing blood pressure over a 6-month period compared with a control group. Additional smaller randomized controlled trials, some of which were stopped early after results of the Symplicity HTN-3 trial became available, did not demonstrate significantly improved outcomes with renal denervation. Single-arm studies with overlapping populations have reported improvements in blood pressure and related physiologic parameters, such as echocardiographic measures of left ventricular hypertrophy, that appear to be durable up to 24 months of follow-up. The strongest evidence comes from sham-controlled trials, the largest of which found no significant benefits with renal denervation. Meta-analyses of the systematic reviews have also reported inconsistent findings, with most analyses showing no significant benefit in blood pressure measurements following RFA. The evidence is insufficient to determine the effects of the technology on health outcomes.

Supplemental Information

Practice Guidelines and Position Statements

American Heart Association et al

The American Heart Association, American College of Cardiology, and American Society of Hypertension (2015) issued joint guidelines on the treatment of hypertension in patients with coronary artery disease.44 The guidelines noted the Symplicity HTN-3 trial did not find a significant benefit from renal denervation and stated that additional randomized controlled trials would be needed.

The American Heart Association, American College of Cardiology, and 9 additional specialty societies (2018) published joint guidelines on the prevention, detection, evaluation, and management of high blood pressure in adults.45 In discussing resistant hypertension, the guidelines indicated that studies using catheter ablation of renal sympathetic nerves "have not provided sufficient evidence to recommend the use of these devices."

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Joint UK Societies
The British Hypertension Society and 3 other British medical societies (collectively, the Joint UK Societies) issued an expert consensus statement (2014) on renal denervation for resistant hypertension, which concluded: “The Joint UK Societies did not recommend the use of renal denervation for treatment of resistant hypertension in routine clinical practice but remains committed to supporting research activity in this field.”

Eighth Joint National Committee
The Eighth Joint National Committee (2014), which was appointed to provide recommendations on hypertension treatment, published an evidence-based guideline on the management of hypertension in adults. These recommendations did not discuss the use of renal denervation.

European Society of Cardiology
The European Society of Cardiology (2013) issued an expert consensus statement on catheter-based renal denervation, which concluded that, based on the available evidence, renal denervation can be considered as a treatment option in “patients with resistant hypertension, whose blood pressure cannot be controlled by a combination of lifestyle modification and pharmacological therapy according to current guidelines.”

The statement indicated that patients should meet the following criteria before renal denervation is considered:

- “Office-based systolic BP [blood pressure] ≥160 mmHg (≥150 mmHg diabetes type 2)
- ≥3 antihypertensive drugs in adequate dosage and combination (incl. diuretic)
- Lifestyle modification
- Exclusion of secondary hypertension
- Exclusion of pseudo-resistance using ABPM [ambulatory blood pressure monitoring] (average BP > 130 mmHg or mean daytime BP > 135 mmHg)
- Preserved renal function (GFR [glomerular filtration rate] ≥ 45 mL/min/1.73 m^2)
- Eligible renal arteries: no polar or accessory arteries; no renal artery stenosis; no prior revascularization.”

U.S. Preventive Services Task Force Recommendations
Not applicable.

Medicare National Coverage
There is no national coverage determination (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

REFERENCES


FEP 7.01.136 Radiofrequency Ablation of the Renal Sympathetic Nerves as a Treatment for Resistant Hypertension


POLICY HISTORY

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<tr>
<th>Date</th>
<th>Action</th>
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<tr>
<td>March 2013</td>
<td>New Policy</td>
<td>Radiofrequency ablation of the renal sympathetic nerves is considered investigational for the treatment of resistant hypertension</td>
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<tr>
<td>December 2013</td>
<td>Update Policy</td>
<td>Policy updated with literature review. References 5, 6, 17-20 added. No change in policy statement.</td>
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<tr>
<td>December 2014</td>
<td>Update Policy</td>
<td>Policy updated with literature review. References 4-5, 8-9, 11-12, 16, 19, 29-36, 38-43, and 46 added. No change in policy statement.</td>
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<td>March 2016</td>
<td>Update Policy</td>
<td>Policy updated with literature review through August 3, 2015; references 4-5, 8, 12-13, 16-17, 51, 54-55, and 57-58 added. Policy statement unchanged.</td>
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<td>December 2017</td>
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<td>Policy updated with literature review through July 20, 2017; no references added. Policy statement unchanged.</td>
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<tr>
<td>December 2018</td>
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<td>Policy updated with literature review through July 9, 2018; references 5-6, 11, 18-20, 28-29, 34-35, and 45 added. Policy statement unchanged.</td>
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